

FORM PTO-1390
(Modified) (REV 10-95)

U. S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

60,130-884

U. S. APPLICATION NO. (IF KNOWN, SEE 37
CFR 1.5) **09/647126**

INTERNATIONAL APPLICATION NO
PCT/GB99/00839

INTERNATIONAL FILING DATE
18 March 1999

PRIORITY DATE CLAIMED
26 March 1998

TITLE OF INVENTION
DISC BRAKE SEAL ASSEMBLY

APPLICANT(S) FOR DO/EO/US
Paul Roberts, Paul Thomas, and Don Hobday

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
 - a. ☒ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 13 to 18 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A substitute specification.
17. ☐ A change of power of attorney and/or address letter.
18. ☒ Certificate of Mailing by Express Mail.
19. ☐ Other items or information:

CERTIFICATE OF EXPRESS MAIL

I hereby certify that the enclosed Documents are being deposited with the United States Postal Service as Express Mail, postage prepaid, in an envelope as "Express Mail Post Office to Addressee," mailing label No. EL673655535US, and addressed to Box PCT, Assistant Commissioner of Patents and Trademarks, Washington D C 20231 on September 26, 2000.

Lesley Ramaut
Lesley Ramaut

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Page 2 of 2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Thomas, et al.
Serial No.: Unknown
Filed: Herewith
Priority PCT/GB99/00839 Filed: March 18, 1999
GB 9806543.6 Filed March 26, 1998
Group Art Unit: Unknown
Examiner: Unknown
Title: DISC BRAKE SEAL ASSEMBLY

PRELIMINARY AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231

Dear Sir:

Please amend the application in the following particulars prior to Examination.

IN THE SPECIFICATION:

Page 1, following the title of the invention, please insert the following section heading, --
BACKGROUND OF THE INVENTION--.

Page 1, before the fourth paragraph, please insert the following section heading --
SUMMARY OF THE INVENTION--.

Page 3, before the sixth paragraph, please insert the following section heading --BRIEF DESCRIPTION OF THE DRAWINGS--.

Page 4, before the second paragraph, please insert the following section heading --DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT--.

Page 6, line 17, please delete "sleeve 25" and insert therefor --shaft 25--.

Please insert the following paragraph at the end of page 7.

-- The foregoing description is only exemplary of the principles of the invention. Many modifications and variations of the present invention are possible in light of the above teachings. The preferred embodiments of this invention have been disclosed, however, so that one of ordinary skill in the art would recognize that certain modifications would come within the scope of this invention. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specially described. For that reason the following claims should be studied to determine the true scope and content of this invention.--

IN THE CLAIMS:

At page 8, please insert the claims section heading --What is claimed is:--

Claim 3, line 1, please delete "claim 1 or".

Claim 7, line 1, please delete "claim 5 or".

Claim 11 line 1, please delete "claim 9 or".

Claim 15, line 1, please delete "claim 13 or".

Claim 17, line 1, please delete "according to any one of claims 9 to 16" and insert --as recited in claim 9-- prior to "incorporating".

18. (NEW) A disc brake according to claim 13 incorporating a thrust assembly.

REMARKS

By this Preliminary Amendment multiple dependencies have been removed. Applicant respectfully requests examination of this application.

Respectfully Submitted,

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Dated:

9/26/00

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Thomas, et al.
Serial No.: 09/647,126
Filed: September 26, 2000
Priority PCT/GB99/00839 Filed: March 18, 1999
GB 9806543.6 Filed March 26, 1998
Group Art Unit: Unknown
Examiner: Unknown
Title: DISC BRAKE SEAL ASSEMBLY

AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231

Dear Sir:

Please amend the application in the following particulars prior to Examination.

IN THE CLAIMS:

Please cancel claims 1-18.

19. (NEW) A seal device for use in an adjustable tappet assembly for a disc brake for sealing between an internally threaded outer sleeve and an externally threaded

internal shaft of the assembly, said device comprising a support element adapted to be carried by said sleeve, said support element carrying a seal for sealing between said sleeve and said shaft having a lip portion arranged to engage an unthreaded surface portion of said shaft in sealing relationship for providing a high integrity seal during axial movement of said shaft relative to said sleeve.

20. (NEW) The seal device as recited in claim 19 wherein an outer surface of the support element serves, in use, to provide a smooth sealing surface for engagement by a lip portion of a further seal carried by an adjacent structure.
21. (NEW) The seal device as recited in claim 20 wherein said support element is in the form of a cap having a generally annular skirt adapted to fit, in use, over an end portion of said sleeve, said outer surface of said skirt serving for engagement by said further seal.
22. (NEW) The seal device as recited in claim 19 wherein said support element is carried externally by said sleeve.
23. (NEW) The seal device as recited in claim 19 wherein an annular base of said support element rests, in use, against said adjacent end of said sleeve with a portion of said shaft extending through said base.
24. (NEW) The seal device as recited in claim 19 wherein said annular base houses an annular rim of said seal for sealing between said sleeve and said shaft.

25. (NEW) The seal device as recited in claim 19 wherein said lip portion of said seal for sealing between said sleeve and said shaft extends axially away from said base and said sleeve.
26. (NEW) An adjustable tappet assembly for a disc brake comprising an internally threaded outer sleeve, an externally threaded internal shaft, and a seal device, said seal device having a support element carried by said sleeve, said support element carrying a seal for sealing between said sleeve and said shaft having a lip portion arranged to engage an unthreaded surface portion of said shaft in sealing relationship for providing a high integrity seal during axial movement of said shaft relative to said sleeve.
27. (NEW) The assembly as recited in claim 26 wherein an outer surface of said support element provides a smooth sealing surface engaged, in use, by a lip portion of a further seal carried by an adjacent structure.
28. (NEW) The assembly as recited in claim 27 wherein said support element is in the form of a cap having a generally annular skirt fitted over an end portion of said sleeve, said outer surface of said skirt providing said sealing surface engaged by said further seal.
29. (NEW) The assembly as recited in claim 26 wherein said support element is carried externally by said sleeve.
30. (NEW) The assembly as recited in claim 26 wherein an annual base of said support element, rests, in use, against an adjacent end of said sleeve with a portion of said shaft extending through said base.

31. (NEW) The assembly as recited in claim 26 wherein said annular base houses an annular rim of said seal for sealing between said sleeve and said shaft.
32. (NEW) The assembly as recited in claim 26 wherein said lip portion of said seal for sealing between said sleeve and said shaft extends axially away from said base and said sleeve.
33. (NEW) The assembly as recited in claim 26 wherein said assembly is incorporated into a disc brake.

REMARKS

By this Amendment, claims 1-18 have been deleted and new claims 19-33 have been added. By this amendment multiple dependencies have been removed.

Applicant has submitted herewith a Notice of Missing Requirements and the required declaration. Applicant has also submitted herewith an executed Assignment and a Recordation Cover Sheet.

Thus, claims 19-33 are in condition for allowance. A check for \$170.00 is enclosed to cover the cost of the surcharge fee (\$130.00) and the Assignment Recordation (\$40.00). As the multiple dependent claims have been removed, no further fee is required. The Commissioner is authorized to charge Deposit Account No. 50-1482, in the name of Carlson, Gaskey & Olds, P.C., for any additional fees or credit the account for any overpayment.

Applicant respectfully requests examination of this application.

Respectfully Submitted,

CARLSON, GASKEY & OLDS, P.C.

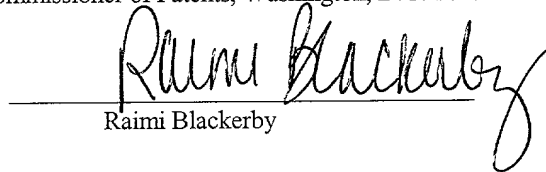


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Dated: November 15, 2000

CERTIFICATE OF MAILING

I hereby certify that this Amendment is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to Box PCT, Assistant Commissioner of Patents, Washington, D.C. 20231 on November 15, 2000.


Raimi Blackerby

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- 1 -

DISC BRAKE SEAL ASSEMBLY

This invention relates to a seal device for use in sealing between parts of a thrust assembly of a disc brake, primarily for a motor vehicle, and to a disc brake incorporating the seal device and thrust assembly.

One conventional type of thrust assembly, in the form of an adjustable tappet assembly, has a pair of threadedly interengaged parts forming a strut of which the length can be varied by relative rotation between the parts to perform a brake adjustment, in use. In order to provide the necessary sealing between the relatively rotatable strut parts and between the strut parts and adjacent surfaces, it has been necessary to provide multiple seals, together with inserts for the retention and/or support of the seals, as well as to effect machining of the parts to provide adequate sealing surfaces for engagement by the various seals. Such arrangements are complicated to manufacture and assemble, giving rise to relatively high costs.

An object of the invention is to provide a simpler and more cost-effective seal device for use in a thrust assembly of a disc brake, as compared with the aforesaid conventional arrangements.

According to a first aspect of the invention, a seal device for use in sealing between parts of a thrust assembly of a disc brake comprises a support element adapted to be carried externally by a first part of the thrust assembly, the support element carrying a seal arranged so that, with the support element in its position of use on the first part, the seal engages a surface of a second part of the thrust assembly in sealing relationship.

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In one convenient arrangement, an outer surface of the support element serves, in use, for engagement by a further seal carried by adjacent structure.

Preferably, the support element is in the form of a cap having a generally annular skirt adapted to fit, in use, over an end portion of the first element, the outer surface of the skirt serving for engagement by said further seal.

According to another aspect of the invention, a seal device for use in sealing between parts of a thrust assembly of a disc brake comprises a support element adapted to be carried by a first part of the thrust assembly, the support element carrying a seal arranged so that, with the support element in its position of use on the first part, the seal engages a surface of a second part of the thrust assembly in sealing relationship, the support element being arranged so that an outer surface thereof serves, in use, for engagement by a further seal carried by adjacent structure.

Preferably, the support element is carried externally by said first part of the thrust assembly and is conveniently in the form of a cap having a generally annular skirt adapted to fit, in use, over an end portion of the first element, the outer surface of the skirt serving for engagement by said further seal.

According to a further aspect of the invention, a thrust assembly comprises a pair of relatively movable parts, and a seal device which has a support element carried externally by a first of said parts, the support element carrying a seal arranged to engage a surface of a second of said parts in sealing relationship.

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Conveniently, an outer surface of the support element provides a sealing surface engaged by a further seal carried by adjacent structure.

The support element is preferably in the form of a cap having a generally annular skirt fitted over an end portion of the first element, the outer surface of the skirt providing the sealing surface engaged by the further seal.

According to a yet further aspect of the invention a thrust assembly comprises a pair of relatively movable parts, and a seal device which has a support element carried by a first of said parts, the support element carrying a seal arranged to engage a surface of a second of said parts in sealing relationship, the support element being arranged so that an outer surface thereof serves, in use, for engagement by a further seal carried by adjacent structure.

Preferably the support element is carried externally by said first part and is conveniently in the form of a cap having a generally annular skirt fitted over an end portion of the first element, the outer surface of the skirt providing the sealing surface engaged by the further seal.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Figure 1 is a plan view, partly in cross-section, of one form of the brake of the invention;

Figure 2 is a cross-section along line A-A of Figure 1, and

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Figure 3 is an enlarged cross-sectional view of a thrust member forming part of the brake of Figures 1 and 2.

Referring to Figures 1 and 2 of the drawings, the illustrated disc brake has a fixed carrier 1 which carries a pair of friction pads 2, 3 disposed respectively at either side of a brake disc 4. The carrier serves to mount the brake on a vehicle and to absorb torque sustained by the pads during a braking operation. A clamp member or caliper 5 straddles the brake disc and is mounted on the carrier so as to be slidable axially of the brake disc relative to the carrier, by way of pins 6, in conventional manner. The caliper carries an integral housing 7 which is adapted to mount a conventional air or other power actuator (not shown) on an external face 8 thereof. The housing defines a chamber 9 within which a pivotal brake actuating lever 10 may conveniently perform an angular reciprocal swinging movement, as indicated by the arrows (Figure 2), under the action of a thrust member of the power actuator which, with the latter mounted on the face 8, extends through an opening 11 of the housing into engagement with a recess 12 of the lever 10. The lever is integral with or attached to a rotary actuating member 13 which is rotatably supported within the caliper by way of a pair of needle bearing assemblies 14. The member 13 is recessed to house respective cylindrical rollers 15, 16, the axes of which are offset from the rotary axis of the actuating member 13 to form an eccentric actuating arrangement with the rollers 15 and 16 bearing against respective thrust members 17A and 18A of adjacent adjustable tappet assemblies indicated generally at 17 and 18. Rotation of the lever 10 and its connected shaft 13 causes actuating thrust to be applied via the tappet assemblies to the directly actuated friction element 2 and, by a reaction via the caliper 5, to the indirectly actuated friction element 3.

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The thrust assemblies, illustrated as adjustable tappet assemblies 17 and 18, are disposed at either side of a centre line of the brake passing through the lever 10 and are associated with an adjuster assembly 19 which lies laterally offset from and adjacent the tappet assembly 18. The adjuster assembly may be of any appropriate conventional type needing no detailed description for the purpose of the present invention. The adjuster responds to excessive movement of the friction elements 2, 3 and produces resultant rotation of an adjuster shaft 20 which, via an output gear 21 and an intermediate idler gear 21A, rotates a pair of input gears 22, 23 associated respectively with the adjustable tappet assemblies 17, 18.

The tappet assemblies are of identical construction and operation, and only the assembly 17 will be described, with reference to Figures 1 and 3, in sufficient detail for a full understanding of the present invention. This assembly has an outer sleeve 24 which is internally threaded at 24A and receives a hollow internal shaft 25 having an externally threaded portion 25A extending over a part of its length for cooperation with the internal thread of the sleeve 24. The shaft and sleeve form between them an adjuster strut of variable length. The shaft 25 is provided, at its outer end, with a tappet head 26, which bears against the adjacent friction element 2 and which is releasably coupled to the shaft so as, conveniently, to be freely rotatable relative to the latter. To enable the shaft 25 to be moved axially by rotation of the sleeve 24 so as to extend the adjuster strut in compensation for wear of the friction elements, it is necessary to lock this shaft against rotary movement. This is achieved, in the present embodiment, by providing the thrust member 17A, which is engaged over the adjacent end of the sleeve 24, with an elongate stem 27 of non-

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circular cross-section which extends within the hollow shaft 25, of which at least a part 25B of the internal surface forms a complementary bore. The thrust members 17A and 18A of the respective tappet assemblies are each provided with, for example, a generally planar external surface for locking engagement with a corresponding adjacent surface on a fixed plate 28.

The present invention is concerned particularly with improving the sealing arrangement between the outer sleeve 24 and inner shaft 25. To this end, as can be seen in Figure 3, an end portion of the sleeve 24 adjacent the tappet head 26 is relieved to provide a reduced diameter portion 29, which carries a support element 31 of a seal device, the element 31 being in the general form of a cap. An annular skirt or flange 30 of the support element is received over the portion 29, conveniently by press-fitting. The inner shaft 25 extends through a flat annular base 32 of the support element which rests against the adjacent end of the sleeve 24 and carries a seal, of which an annular rim 33 is housed within the portion 32. An annular lip 34 of the seal engages the outer surface of the sleeve 25 in sealing relationship. The support element 31 may conveniently be manufactured from stainless steel. A metal retainer 35 has a first annular portion 36, which is a press fit in the caliper 5, and to which is attached a further lip seal 37 engaging the outer surface of the annular skirt 30 of the support element 31, such outer surface providing a smooth sealing surface for cooperation with the lip seal 37. The retainer 35 has a further annular portion 38 lying against an adjacent surface of the caliper 5, the remainder of the retainer forming an annular channel 39 to receive a bead 40 of a main convoluted boot seal 41, a further bead 42 of which is received within a groove of the tappet head 26.

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The above-described sealing device 31 is particularly advantageous in terms of its simplicity and effectiveness in providing a high integrity seal between the sleeve 24 and shaft 25 and also in providing a smooth sealing surface on its cylindrical part 30, for engagement by the further seal 37, thereby largely obviating the necessity for high quality expensive machining and/or plating of the outer surface of the sleeve 24 for sealing purposes.

It will be understood that the seals 34 and 37 may be of any convenient form and retained in any convenient manner on their respective supports 31, 35 which, in turn, may have any convenient shape whilst retaining their essential purpose according to the invention.

The flat annular portion 32 may conveniently provide stop means for limiting the axial movement of the tappet assembly at extremes of adjustment.

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- 8 -**CLAIMS**

1. A seal device for use in an adjustable tappet assembly for a disc brake for sealing between an internally threaded outer sleeve (24) and an externally threaded internal shaft (25) of the assembly, the device comprising a support element (31) adapted to be carried by the sleeve (24), the support element carrying a seal (33, 34), for sealing between the sleeve (24) and the shaft (25), having a lip portion (34) arranged to engage an unthreaded surface portion of said shaft (25) in sealing relationship for providing a high integrity seal during axial movement of the shaft (25) relative to the sleeve (24).
2. A seal device according to claim 1, wherein an outer surface (30) of the support element (31) serves, in use, to provide a smooth sealing surface for engagement by a lip portion of a further seal (37) carried by adjacent structure.
3. A seal device according to Claim 2, wherein the support element (31) is in the form of a cap having a generally annular skirt (30) adapted to fit, in use, over an end portion of the sleeve (24), the outer surface of the skirt (30) serving for engagement by said further seal (37).
4. A seal device according to any one of Claims 1 to 3 wherein the support element (31) is carried externally by said sleeve (24).

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5. A seal device according to any one of Claims 1 to 4, wherein an annular base (32) of the support element (31) rests, in use, against the adjacent end of the sleeve (24) with a portion of said shaft (25) extending through the base (32).
6. A seal device as claimed in Claim 5, wherein the base (32) houses an annular rim (33) of the seal for sealing between the sleeve (24) and the shaft (25).
7. A seal device as claimed in Claim 5 or 6, wherein the lip portion (34) of the seal (33, 34) for sealing between the sleeve (24) and the shaft (25) extends axially away from the base (32) and the sleeve (24).
8. An adjustable tappet assembly for a disc brake, the assembly comprising an internally threaded outer sleeve (24), an externally threaded internal shaft (25), and a seal device (31, 33, 34), the seal device having a support element (31) carried by the sleeve (24), the support element (31) carrying a seal (33, 34), for sealing between the sleeve (24) and the shaft (25), having a lip portion (34) arranged to engage an unthreaded surface portion of said shaft (25) in sealing relationship for providing a high integrity seal during axial movement of the shaft (25) relative to the sleeve (24).
9. An assembly according to Claim 8, wherein an outer surface (30) of the support element (31) provides a smooth sealing surface engaged, in use, by a lip portion of a further seal (37) carried by adjacent structure.

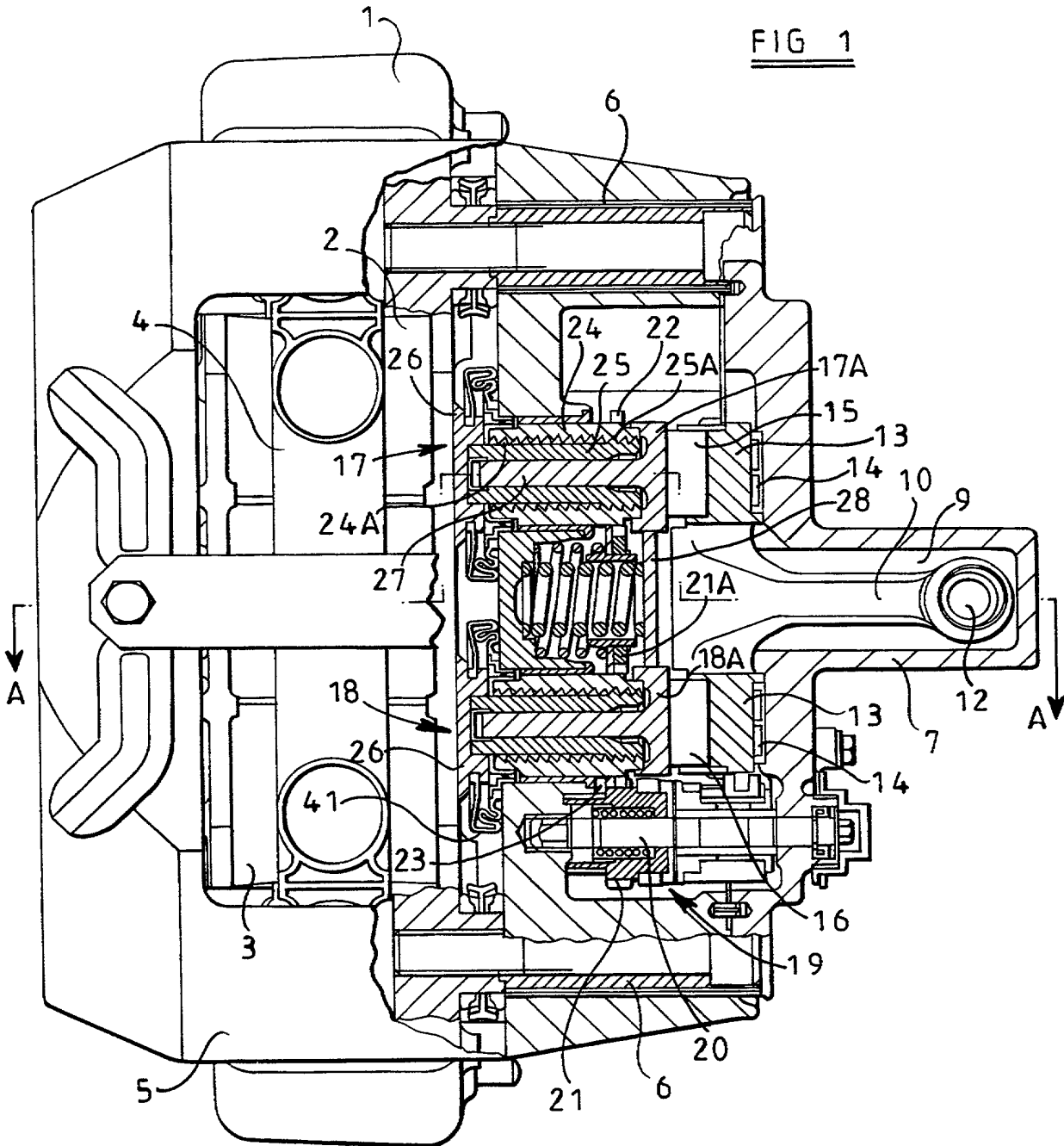
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10. An assembly according to Claim 9, wherein the support element (31) is in the form of a cap having a generally annular skirt (30) fitted over an end portion of the sleeve (24), the outer surface of the skirt (30) providing the sealing surface engaged by the further seal (37).
11. An assembly according to any one of Claims 8 to 10, wherein the support element (31) is carried externally by said sleeve (24).
12. An assembly according to any one of Claims 8 to 11, wherein an annular base (32) of the support element (31), rests, in use, against an adjacent end of the sleeve (24) with a portion of said shaft (25) extending through the base (32).
13. An assembly as claimed in Claim 12, wherein the base (32) houses an annular rim (33) of the seal for sealing between the sleeve (24) and the shaft (25).
14. An assembly as claimed in Claim 12 or 13, wherein the lip portion (34) of the seal (33, 34) for sealing between the sleeve (24) and the shaft (25) extends axially away from the base (32) and the sleeve (24).
15. An adjustable tappet assembly incorporating a sealing device according to any one of Claims 1 to 8.
16. A disc brake incorporating an adjustable tappet assembly according to any one of Claims 8 to 15.

1 / 3

FIG 1



2 / 3

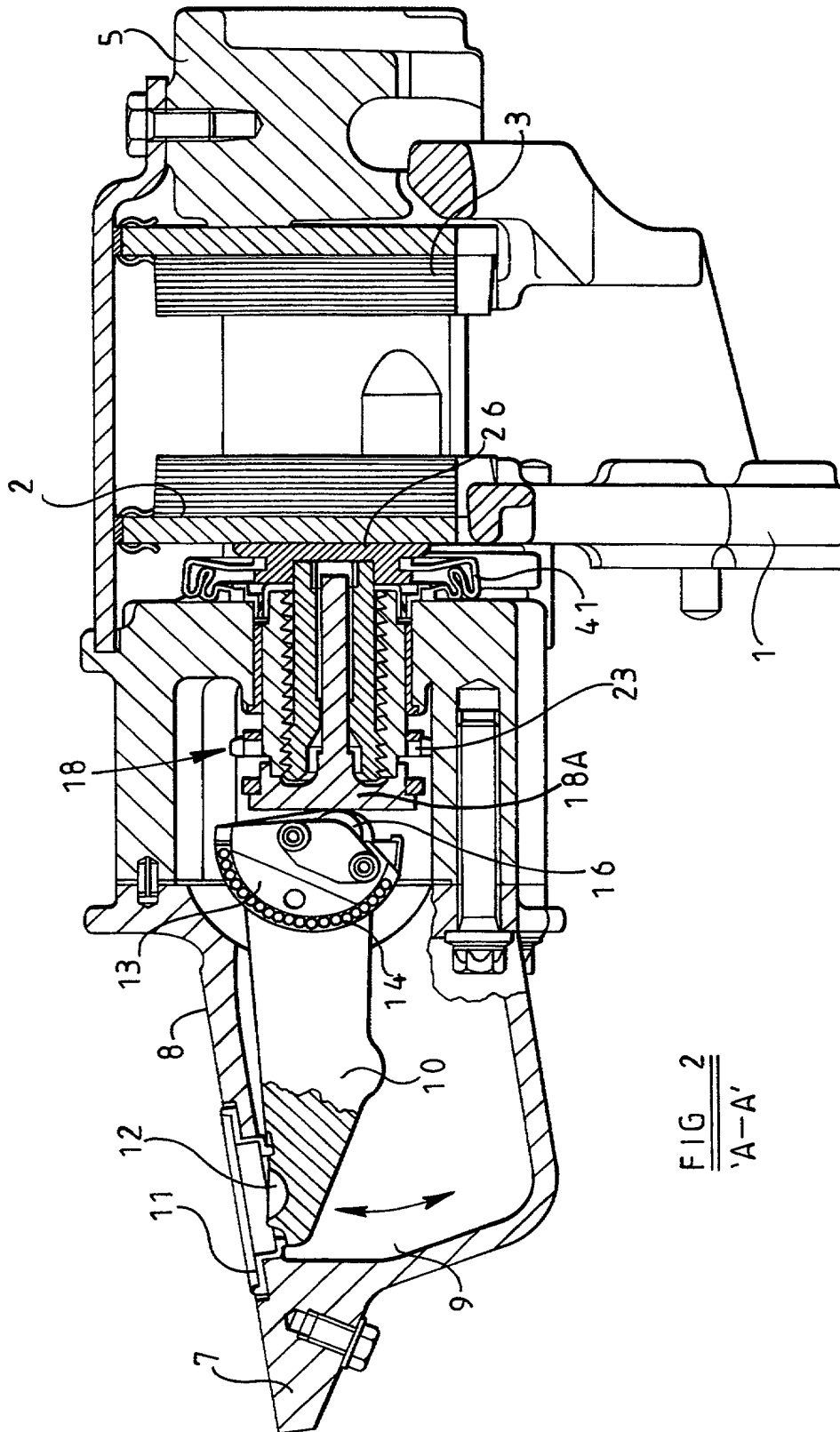
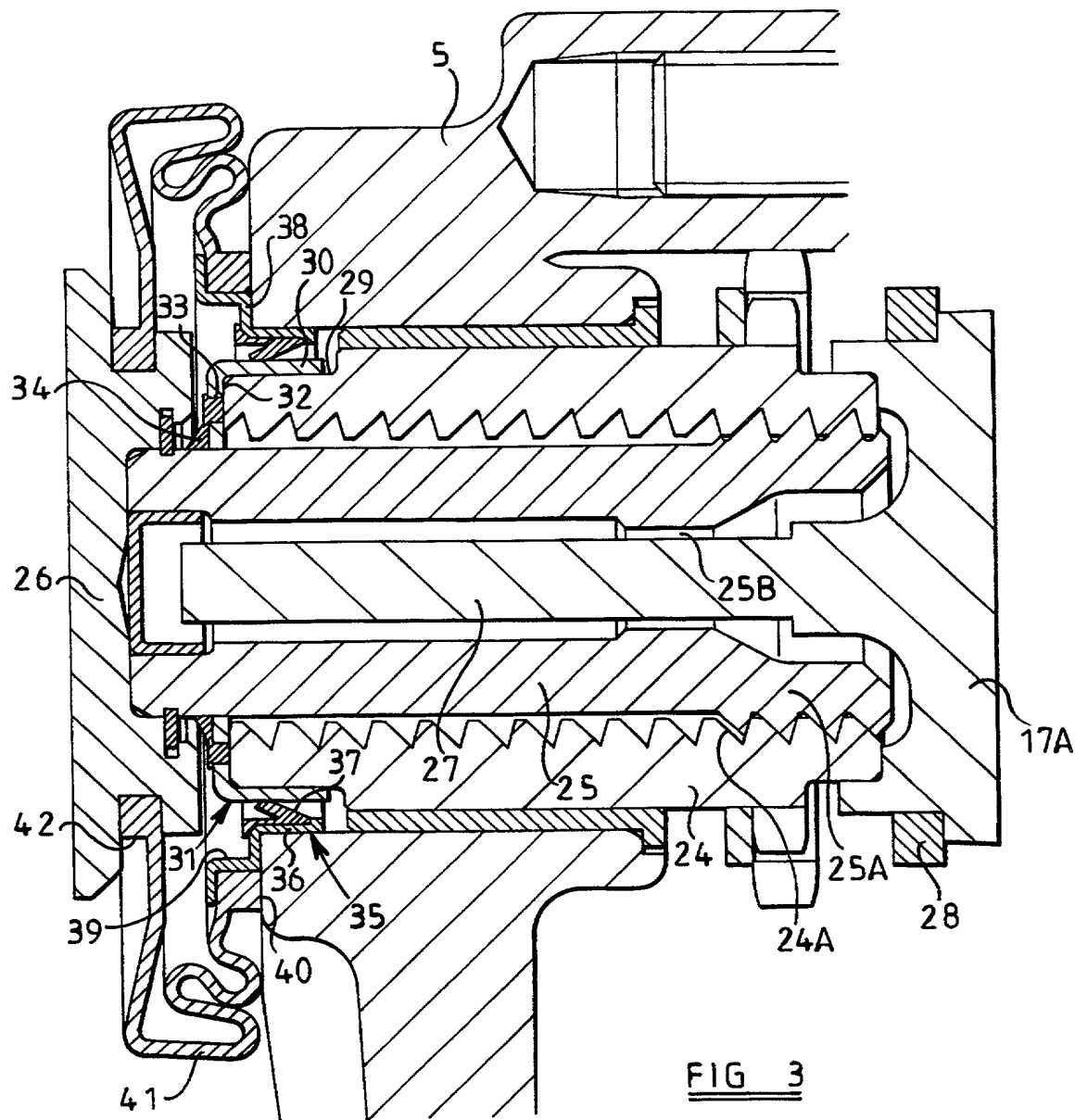


FIG 2
'A-A'



COMBINED DECLARATION AND POWER OF ATTORNEY

As the below named inventors, we hereby declare: that our residences, post office addresses and citizenships are as stated near our names below; that we are joint inventors and we believe we are the original and first inventors of the subject matter of which is claimed and for which a patent is sought on the invention entitled

DISC BRAKE SEAL ASSEMBLY

which is described and claimed in the attached specification and amended by an amendment thereto submitted therewith (if any); that we have reviewed and understand the contents of this specification, including the claims, as amended by any amendment referred to above; that we do not know and do not believe the same was ever known or used in the United States of America before our invention thereof or patented or described in any printed publication, in any country before our invention thereof for more than one year prior to this application, or in public use or on sale in the United States of America more than one year prior to this application; that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by us or our legal representatives or assigns more than twelve (12) months prior to this application; that we acknowledge our duty to disclose information of which we are aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a); and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by us or our legal representatives or assigns except as follows:

PCT/GB99/00839; Filed March 18, 1999
Great Britain Application No. 9806543.6; Filed March 26, 1998

We hereby appoint M. Lee Murrah, Registration No. 27,460; Theodore W. Olds, Registration No. 33,080; Scott M. Confer, Registration No. 40,568; John E. Carlson, Registration No. 37,794; David J. Gaskey, Registration No. 37,139; Kerrie A. Laba, Registration No. 42,777; William Gottschalk, Registration No. 44,130; David Wisz, Registration No. 46,350; and Karin H. Butchko, Registration No. 45,864 as our attorneys to prosecute this application and to transact all business in the Patent and Trademark Office and any foreign patent office connected herewith. Please address all correspondence and telephone calls to:

Karin H. Butchko, Esq.
Carlson, Gaskey & Olds, P.C.
400 W. Maple, Suite 350
Birmingham, MI 48009
(248) 988-8360

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P. Robert

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Citizenship: British

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